



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/808,250	03/24/2004	Takamitsu Higuchi	9319G-000747	4209
27572	7590	10/10/2006	EXAMINER	
HARNESS, DICKEY & PIERCE, P.L.C. P.O. BOX 828 BLOOMFIELD HILLS, MI 48303			SONG, MATTHEW J	
			ART UNIT	PAPER NUMBER
			1722	

DATE MAILED: 10/10/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

**Application No.**

10/808,250

**Applicant(s)**

HIGUCHI ET AL.

**Examiner**

Matthew J. Song

**Art Unit**

1722

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 17 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) 14-18 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-13 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO/SB/08)  
Paper No(s)/Mail Date 3/24/04.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_.

## DETAILED ACTION

### *Election/Restrictions*

1. Claims 14-18 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Election was made **without** traverse in the reply filed on 7/17/2006.

### *Claim Rejections - 35 USC § 103*

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

3. Claims 1-5 are rejected under 35 U.S.C. 103(a) as being unpatentable over Komatsu et al ("Growth and Characterization of Potassium Niobate (KNbO<sub>3</sub>) Crystal from an Aqueous Solution" from IDS filed 3/24/2004") in view of Burger et al (WO 02/00348 A1).

Komatsu et al teaches a method of growing single crystal potassium niobate (KN) by precipitating orthorhombic KN from an aqueous solution (Abstract and pg 5659). Komatsu et al also teaches the epitaxial growth of KN growth on a substrate because KN grows by spontaneous nucleation in the aqueous solution with  $K_2NbO_3F$  (Abstract and pg 5659), this clearly suggests manufacturing a thin film from a liquid of potassium niobate solution.

Komatsu et al does not teach coating liquid drops of KN solution on the substrate.

In a method of dispensing liquids, note entire reference, Burger et al teaches an apparatus for dispensing liquids comprising a metering element a holder for carrying the metering element and a control system for controlling the position of the metering element (pg 1, ln 4-32). Burger et al also teaches a metering element can dispense an exact quantity of liquid between 10 and 200 picoliters (pg 2, ln 15 to pg 3, ln 15), this clearly suggests applicant's liquid drop emission. Burger et al teaches dispensing small quantity of liquid, which clearly suggests applicant's liquid drops because the small quantities of liquid will be expected to form drops due to surface tension within the solution.

Komatsu et al teaches epitaxial growth of KN from an aqueous solution on a substrate and is not particular to the method of contacting the aqueous solution with the substrate.

Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify Komatsu et al by using a conventionally known method of coating a liquid on a substrate using the method taught by Burger et al because Burger et al's method can deliver precise quantities of liquid.

Referring to claims 2-3, the combination of Komatsu et al and Burger et al teaches delivering a liquid volume of 10-200 picoliters ('348 pg 3, ln 1-10). Overlapping ranges are held to be obvious (MPEP 2144.05).

Referring to claim 4, the combination of Komatsu et al and Burger et al is silent to the coating and precipitating step are carried out repeatedly. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of Komatsu et al and Burger et al to repeat the process to grow a larger crystal.

Referring to claim 5, the combination of Komatsu et al and Burger et al teaches a potassium niobate fluoride aqueous solution (Abstract).

#### ***Double Patenting***

4. Claims 1-13 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-12 of copending Application No. 10/916,208 ('208) in view of Komatsu et al ("Growth and Characterization of Potassium Niobate (KNbO<sub>3</sub>) Crystal from an Aqueous Solution" from IDS filed 3/24/2004") and Burger et al (WO 02/00348 A1).

'208 claims a method of precipitating a potassium niobate single crystal by evaporating and precipitating to continuously grow a potassium niobate single crystal thin film (claims 1 and 2).

'208 does not claim growing an orthorhombic potassium niobate single crystal.

In a method of growing a potassium niobate crystal, note entire reference, Komatsu et al teaches a method of growing single crystal potassium niobate (KN) by precipitating

orthorhombic KN from an aqueous solution (Abstract and pg 5659). Komatsu et al also teaches the epitaxial growth of KN growth on a substrate because KN grows by spontaneous nucleation in the aqueous solution with  $K_2NbO_3F$  (Abstract and pg 5659), this clearly suggests manufacturing a thin film from a liquid of potassium niobate solution.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify '208 by growing an orthorhombic crystal potassium niobate single crystal, as taught by Komatsu et al, because an orthorhombic crystal has useful piezoelectric properties (Komatsu et al pg 5658)

The combination of '208 and Komatsu et al does not teach coating with liquid drops.

In a method of dispensing liquids, note entire reference, Burger et al teaches an apparatus for dispensing liquids comprising a metering element a holder for carrying the metering element and a control system for controlling the position of the metering element (pg 1, ln 4-32). Burger et al also teaches a metering element can dispense an exact quantity of liquid between 10 and 200 picoliters (pg 2, ln 15 to pg 3, ln 15), this clearly suggests applicant's liquid drop emission. Burger et al teaches dispensing small quantity of liquid, which clearly suggests applicant's liquid drops because the small quantities of liquid will be expected to form drops due to surface tension within the solution.

The combination of '208 and Komatsu et al teaches epitaxial growth of KN from an aqueous solution on a substrate and is not particular to the method of contacting the aqueous solution with the substrate. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of '208 and Komatsu et al by using

Art Unit: 1722

a conventionally known method of coating a liquid on a substrate using the method taught by Burger et al because Burger et al's method can deliver precise quantities of liquid.

Referring to claims 2-3, the combination of '208, Komatsu et al and Burger et al teaches 10-200 picoliters.

Referring to claim 4-5, the combination of '208, Komatsu et al and Burger et al teaches repeating the steps ('208 claim 2) and using potassium niobate fluoride (Komatsu Abstract).

Referring to claim 6-13, the combination of '208, Komatsu et al and Burger et al teaches all of the possible substrates claimed (see '208 claims 4-12).

This is a provisional obviousness-type double patenting rejection.

5. Claims 1-13 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-12 of copending Application No. 10/761,147 ('147) in view of Komatsu et al ("Growth and Characterization of Potassium Niobate ( $\text{KNbO}_3$ ) Crystal from an Aqueous Solution" from IDS filed 3/24/2004") and Burger et al (WO 02/00348 A1).

'147 claims a method of precipitating a potassium niobate single crystal from a liquid phase (claim 1).

'147 does not claim growing an orthorhombic potassium niobate single crystal.

In a method of growing a potassium niobate crystal, note entire reference, Komatsu et al teaches a method of growing single crystal potassium niobate (KN) by precipitating orthorhombic KN from an aqueous solution (Abstract and pg 5659). Komatsu et al also teaches the epitaxial growth of KN growth on a substrate because KN grows by spontaneous nucleation

Art Unit: 1722

in the aqueous solution with  $K_2NbO_3F$  (Abstract and pg 5659), this clearly suggests manufacturing a thin film from a liquid of potassium niobate solution.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify '147 by growing an orthorhombic crystal potassium niobate single crystal, as taught by Komatsu et al, because an orthorhombic crystal has useful piezoelectric properties (Komatsu et al pg 5658)

The combination of '147 and Komatsu et al does not teach coating with liquid drops.

In a method of dispensing liquids, note entire reference, Burger et al teaches an apparatus for dispensing liquids comprising a metering element a holder for carrying the metering element and a control system for controlling the position of the metering element (pg 1, ln 4-32). Burger et al also teaches a metering element can dispense an exact quantity of liquid between 10 and 200 picoliters (pg 2, ln 15 to pg 3, ln 15), this clearly suggests applicant's liquid drop emission. Burger et al teaches dispensing small quantity of liquid, which clearly suggests applicant's liquid drops because the small quantities of liquid will be expected to form drops due to surface tension within the solution.

The combination of '147 and Komatsu et al teaches epitaxial growth of KN from an aqueous solution on a substrate and is not particular to the method of contacting the aqueous solution with the substrate. Therefore, it would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of '147 and Komatsu et al by using a conventionally known method of coating a liquid on a substrate using the method taught by Burger et al because Burger et al's method can deliver precise quantities of liquid.



Art Unit: 1722

Referring to claims 2-3, the combination of '147, Komatsu et al and Burger et al teaches 10-200 picoliters.

Referring to claim 4, the combination of '147, Komatsu et al and Burger et al is silent to repeating the steps. It would have been obvious to a person of ordinary skill in the art at the time of the invention to modify the combination of '147, Komatsu et al and Burger et al by repeating the steps to grow a larger crystal.

Referring to claim 5, the combination of '147, Komatsu et al and Burger et al teaches using potassium niobate fluoride (Komatsu Abstract).

Referring to claim 6-13, the combination of '147, Komatsu et al and Burger et al teaches all of the possible substrates claimed (see '147 claims 3-12).

This is a provisional obviousness-type double patenting rejection.

### ***Conclusion***

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Matthew J. Song whose telephone number is 571-272-1468. The examiner can normally be reached on M-F 9:00-5:00.


If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Yogendra Gupta can be reached on 571-272-1316. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 1722

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Matthew J Song  
Examiner  
Art Unit 1722

MJS  
September 29, 2006

  
YOGENDRA N. GUPTA  
SUPERVISORY PATENT EXAMINER  
TECHNOLOGY CENTER 1700